



BIHAR STATE POWER TRANSMISSION COMPANY LTD.

[A GOVERNMENT OF BIHAR UNDERTAKING]

132/33 KV GSS BENIPUR

APPRENTICESHIP TRAINING [FINAL] REPORT

PRESENTED BY-
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INTRODUCTION:-

GRID SUB- STATION [GSS] BENIPUR 132/33 KV

Bihar state power transmission company limited a wholly Owned corporate entity under bihar goverment was incorporated under the companies Act-1956 on 1st Nov. 2012 after restructuring of erstwhile Bihar state Electricity Board . Presently the company is carrying on intra state transmission and wheeting of electicity under license issued by the bihar electicity regulatory commission.

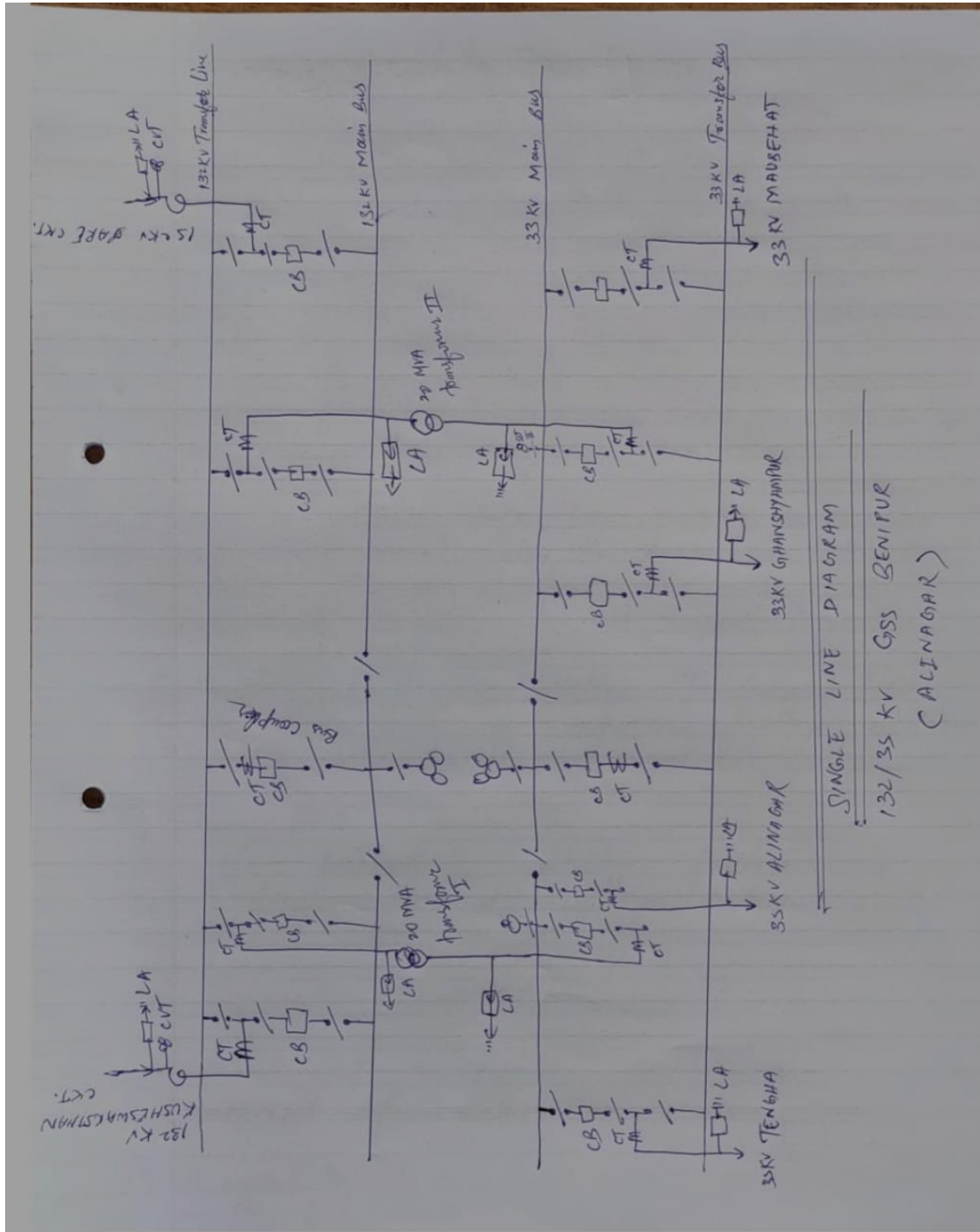
BSPTCL operates a transmission network of 5993.932 Kms of 132 kv Lines and and and 1662.97 kms. of 220 kV lines and 75 kms of 400 Kv Lines as well as 106 Nos. Of EHV Sub - Stations (95 operational 11 Under Construction)
With 9469.9 MVA transformation Capacity.

The specification cover complete supply , erection and Commissioniy of all Electrical and Mechanical plot and equipment for a topical 132/33kV Substation.

About 132/33 kv
Gss benipur



SINGLE LINE DIAGRAM **132/33 KV GSS BENIPUR**



132 KV SIDE:-

1. LIGHTNING ARRESTOR [LA]

:-

A lightning arrester is a device used on electrical power system and telecommunication system to protect the insulation and conduction of the system from the damaging effects of lightning .



CAPACTIVE VOLTAGE TRANSFORMER [CVT]

Cvt is used a capacitive voltage divider principle to provide a reduced voltage to secondary windings



WAVE TRAP :-

The wave trap is connected in series with the transmission line, wave trap is used for communication as well as protection



CURRENT TRANSFORMER [CT] :-

A current transformer is used for measurement of alternative electric current.

A ct is a sensor used to measure the current in the grid



ISOLATOR :-

It is an off load device,

It disconnects or isolates the circuit from the main power supply, even though isolators is a switch it is not used as a normal on off switch



SF6 BREAKERS :- [sulphur hexa fluoride]

Sf6 encloserd shall be capable of withusonding the maximum pressure that can occour in service without leakage or permanent distortion



BUS COUPLER :-

A bus coupler is a device which is used to couple one bus to the other without any interruption in power supply and without creating hazardous arcs.



20 MVA TRANSFORMER

[IN GSS BENIPUR THERE ARE TWO , 20 MVA TRANSFORMER AVAILABLE]



- The transformer consists of three main component
- Primary winding : which acts as an input
 - Secondary winding : which acts as the output
 - And the iron core : which serves to srenghte the magnetic field generated

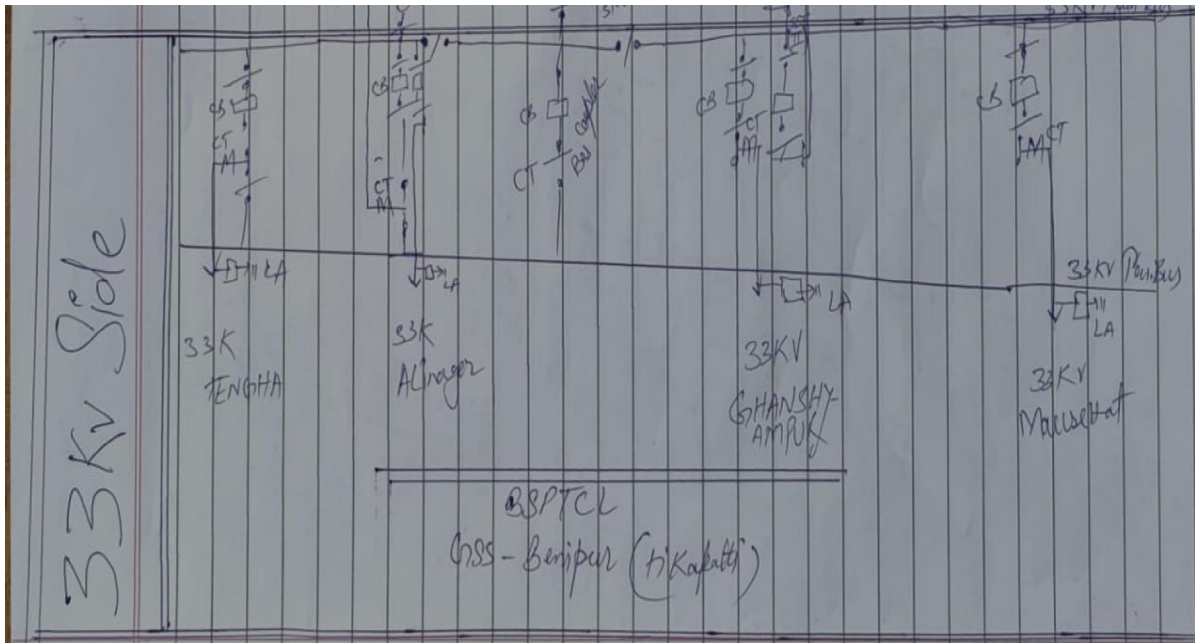
[In our grid the step down transformer is installed to step down 132 kv to 33 kv]

Parts of a transformer:

- Transformer tank
- High voltage bushing
- Low voltage bushing
- Cooling fins\radiator
- Cooling fan's
- Dehydrating breather
- Laminated core
- Buchholz relay

33kv SIDE :—

1. LIGHTING ARRESTER
2. SST 01 AND 02
3. CIRCUIT BREAKER
4. CURRENT TRANSFORMER
5. BUS COUPLER



NOTE ;—

All the equipment are available in 33 kv side are less effective and also power is also less then 132 kv side

BATTERY ROOM

- In battery Room 112v no. of cell in one battery bank each have 2.2v = 250v , in battery room there are two 250v and two 48v battery bank available
- When more than one cells are connected together, it will be a battery.
- The battery room is also known as heart of the substation.
 - Substation batteries typically provide DC supplies for protection and control equipment (principally relays), and also provide trip and close current to circuit breakers.
- In substations rechargeable batteries are used.

- In Benipur GSS
1. 250v battery bank :- 112 no. of cell , each cell rating

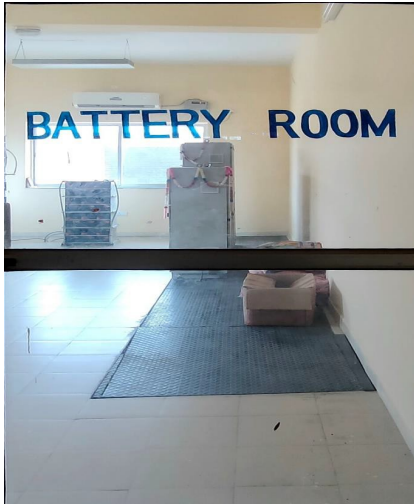
2.2 v dc
300AH

2. 48v battery bank:- 22 no. of cell , each cell rating

2.2v dc
300AH

In gss benipur dry cell used in battery bank .it is also known as VRLA [Valve regulated lead acid battery]

SOME PICTURE OF BATTERY ROOM OF GSS BENIPUR



Battery bank
no.1\48v



BATTERY BANK
NO. 02\48V



BATTREY CHARGEER

A battery charger, recharger, or simply charger, is a device that stores energy in a battery by running an electric current through it. The charging protocol (how much voltage or current for how long, and what to do when charging is complete) depends on the size and type of the battery being charged.

IN GSS BENIPUR: -

Two type of battery charger used

1. battery charger no.1 of 250v

Rating

At Float mode- 30A

At boost mode-45A

Battery bank:- 112 nos.lead
Acid cells of 300AH capacity
[VRLA]

AUTOMATIC FLOAT AND FLOAT CUM BOOST CHARGER		
A. C. INPUT SUPPLY	415 VOLTS $\pm$ 10% 3 PHASE, 4 WIRE, 50 Hz. $\pm$ 5% AC	
FLOAT OUTPUT	274.29 VOLTS 30 AMPS DC CONTINUOUS PLUS TRICKLE CHARGING CURRENT.	
BOOST OUTPUT	EQUIPMENT CAPACITY : 60 AMPS (MAX.) AT FLOAT MODE : 30 AMPS AT BOOST MODE : 45 AMPS	
MAX. OPERATING TEMP.	50° C	
BATTERY BANK	123 NOS. LEAD ACID CELLS OF 300 AH CAPACITY (TYPE - VRLA).	
TYPE - AFFCB	SL. NO.: 4039 / 2	YEAR 2017
Mfg. By : CHLORIDE POWER SYSTEMS & SOLUTIONS LTD. A wholly owned subsidiary of Exide Industries Ltd.		

2. battery charger no.1 of 48v

Rating

At Float mode - 15

At boost mode - 30-35A

Battery bank:- 22 nos.lead
Acid cells of 300AH capacity
[VRLA]

AUTOMATIC FLOAT CUM BOOST CHARGER		
A. C. INPUT SUPPLY	415 VOLTS $\pm$ 10% 3 PHASE, 4 WIRE, 50 Hz. $\pm$ 5% AC	
OUTPUT VOLTAGE	AT FLOAT MODE : 53.52 VOLTS DC. AT BOOST MODE : AT 2.23 V/CELL	
OUTPUT CURRENT	EQUIPMENT CAPACITY : 45 AMPS (MAX.) AT FLOAT MODE : 15 AMPS AT BOOST MODE : 30 AMPS	
MAX. OPERATING TEMP.	50° C	
BATTERY BANK	24 NOS. LEAD ACID CELLS OF 300 AH CAPACITY (TYPE - VRLA).	
TYPE - FCB	SL. NO.: 4038 / 2	YEAR 2017
Mfg. By : CHLORIDE POWER SYSTEMS & SOLUTIONS LTD. A wholly owned subsidiary of Exide Industries Ltd.		

SOME PICTURE OF BATTERY CHARGER. GSS BENIPUR

250v battery charger no.1



250v battery charger no.2



48v battery charger no.1



48v battery charger no.2



DCDB [Direct Current Distribution Box]

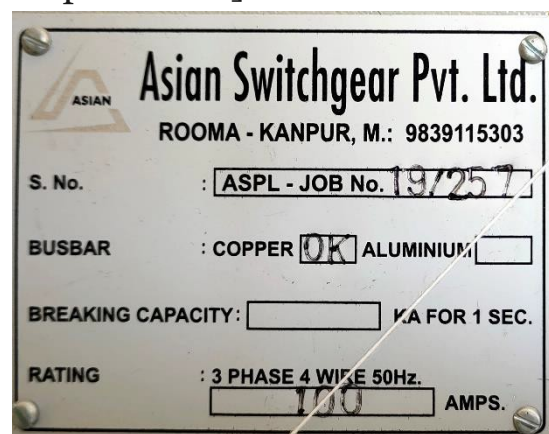
D-C-D-B: DC Distribution Board [D-C-D-B: DC Distribution Board]
As the name says DCDB is used for DC Distribution to different load points. DC is distributed to different load points through their respective MCCBs. There are battery earth fault relays, DC under-voltage or over-voltage relays for protection purposes, installed in DCDB. As the name says DCDB is used for DC Distribution to different load points. DC is distributed to different load points through their respective MCCBs. There are battery earth fault relays, DC under-voltage or over-voltage relays for protection purposes, installed in DCDB.

In GSS benipur There are Two type of DCDB

1. 250v DC
Used in;-
 - *Panel relay
 - *Panel auxiliary relay
 - * Both side breaker for operating coil.



2. 48v DC
Used in: -
 - PLCC [for communication and protection]
 - SDH [tejas]

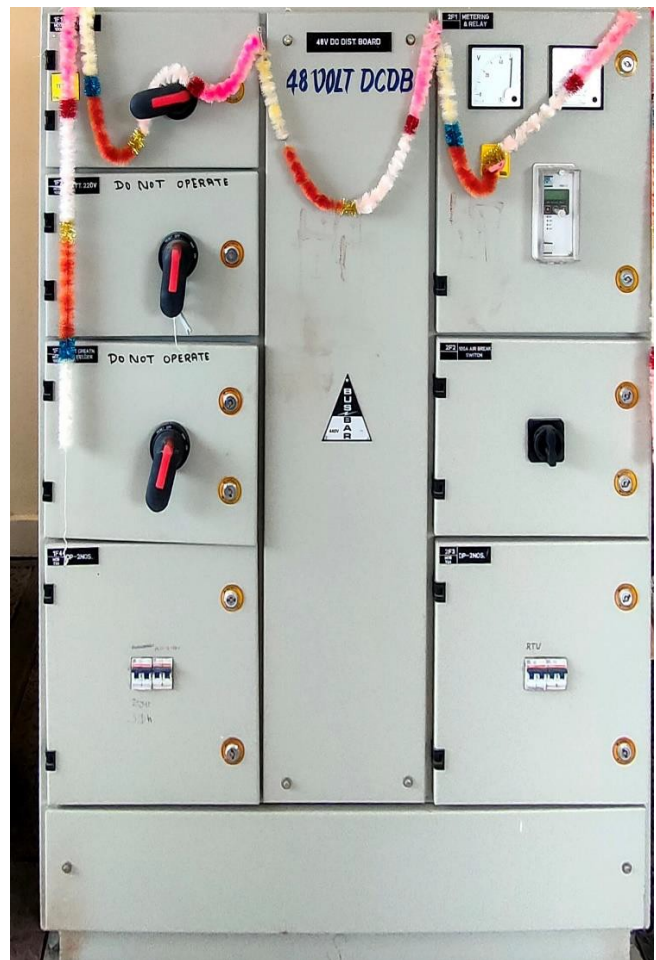


SOME PICTURE OF DCDB GSS BENIPUR

250v DCDB



48V DCDB



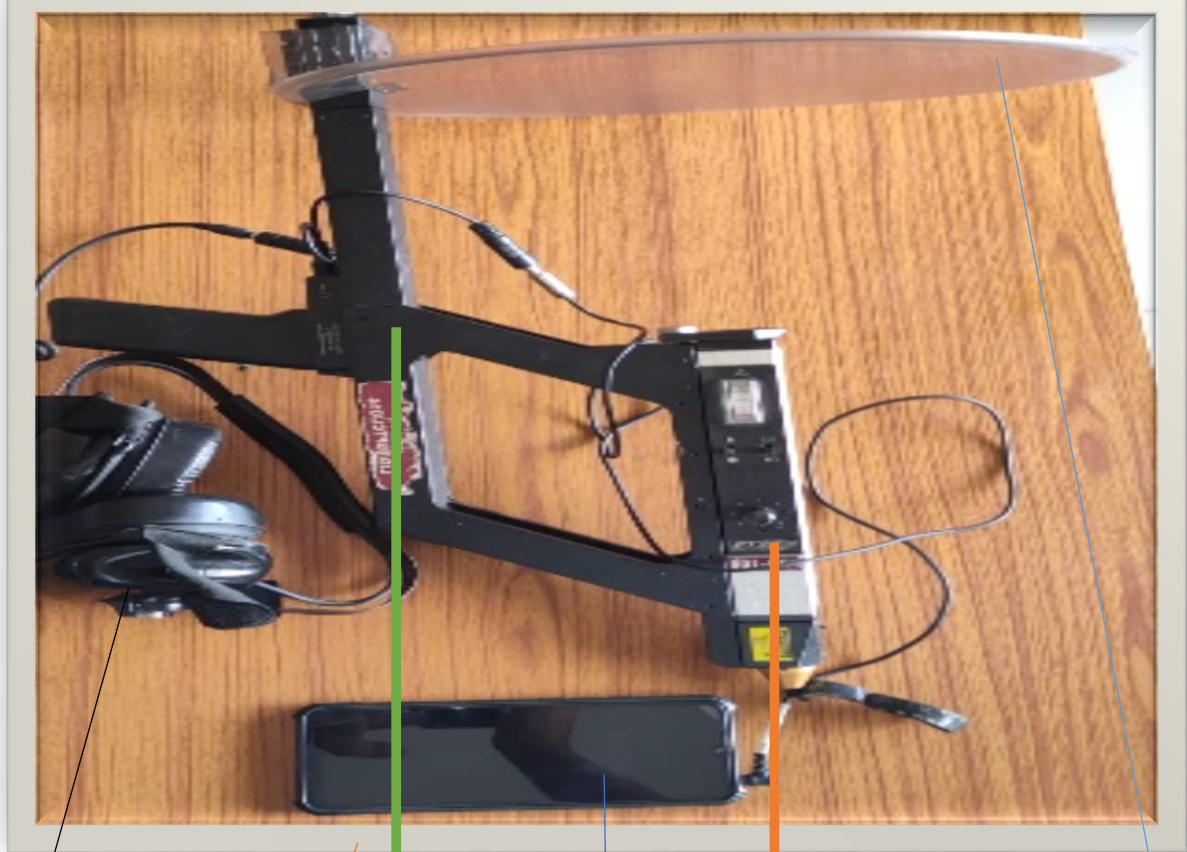
WHAT IS LiDAR

A LiDAR (Light Detection and Ranging) scanner is a special device that uses 3D scanning LIDAR technology that can measure distances by illuminating a target with a laser light and analysing the reflected light. A LIDAR scan can be used in various fields, including geography, archaeology, geology, seismology, forestry and atmospheric physics.

SOME PICTURE OF LiDAR SYSTEM



Detailing of picture



HEADPHONE
FOR LISTENING
OF SOUNDS

MAGNIFYING
GLASS FOR
PROTECTION
OF OUR
EYES

GUN TO
HOLD ALL
ACCESSORIES

NOTE-

THIS SYSTEM IS
AVAILABLE IN OUR
GSS BENIPUR

PHONE FOR
USING AUDIO
SPECTRUM APP

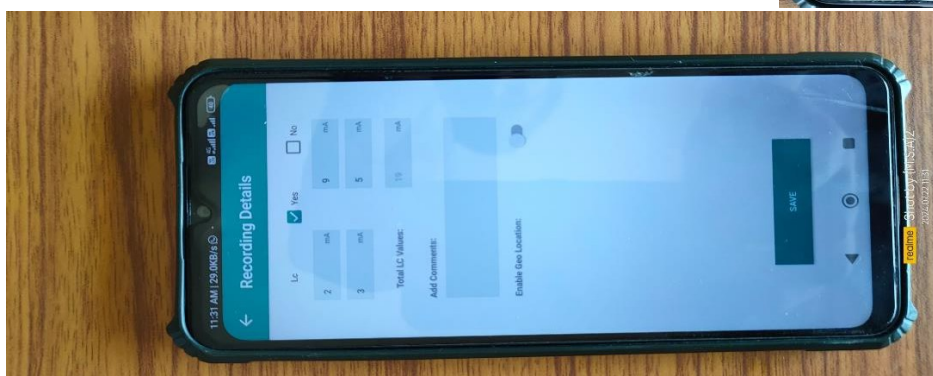
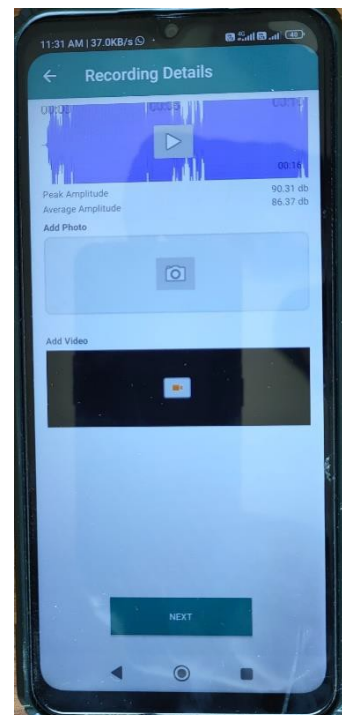
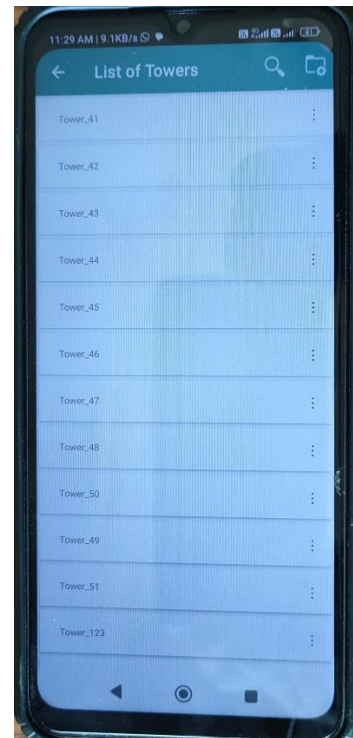
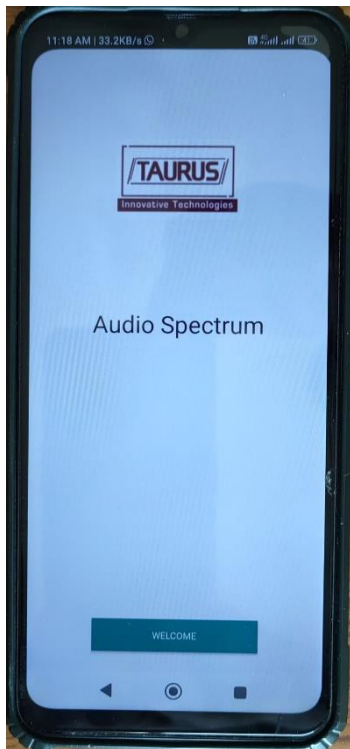
MESSAGE
RECEIVER

LiDAR

Light Detection and Ranging) technology is commonly used in quality control for transmission line inspections. LiDAR uses laser beams to measure distances and generate 3D maps, which can be used to inspect transmission line components such as towers, conductors, and insulators. The technology provides high accuracy and speed, which reduces inspection time and improves overall efficiency.

LiDAR can also be used to detect and locate issues such as cracks, corrosion, and bird nests, which are potential threats to the transmission line's reliability. By incorporating LiDAR technology into transmission line inspections, utilities can ensure the reliability and safety of their electrical transmission systems.

AUDIO SPECTRUM APP.



leakage insulator detector

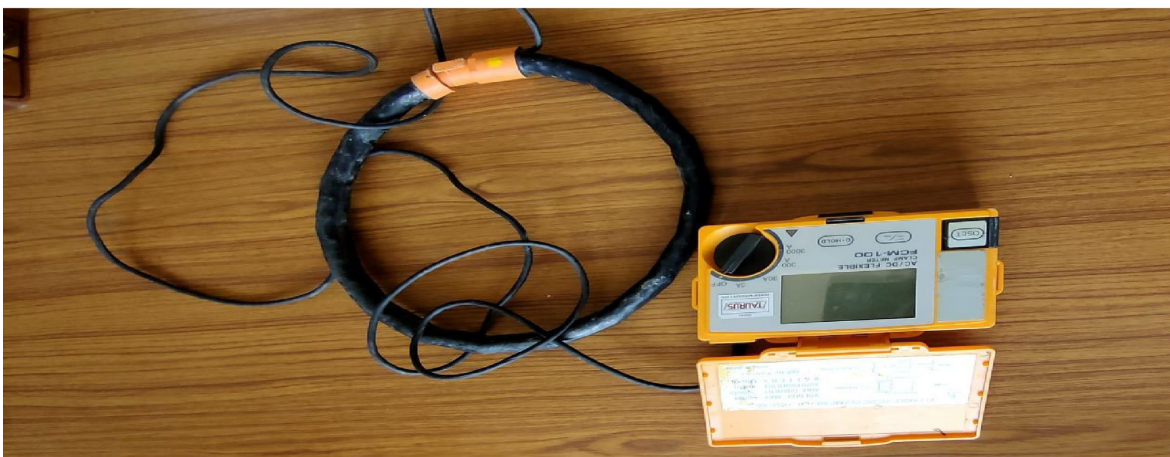
The Leaky Insulator Detector (LID) is a system which utilizes AC/DC Current sensor and Ultrasonic technology for predictive maintenance. The Leaky Insulator Detector (LID) has a Flexible clamp sensor and Ultrasound Receiver.

The Flexible AC/DC Clamp meter is specially designed sensor to measures the AC/DC leakage current in HVAC/HVDC Towers leg (caused due to the leaky insulator) and if the leakage current is greater than average value of nearby 10 towers, this will provide the primary information that the tested tower has leaky insulator and it is a leaky tower.

Ultrasound Receiver is based on Ultrasound Technology which picks Partial Discharge Ultrasound from a distance up to 100 meters and converts Ultrasound into audible sound with digital graph and analogue reading. After leakage current measurement, Ultrasound Receiver is used to scan the insulator strings of the leaky tower and pinpoint the phase and position of the leaky insulator.

SOME PICTURE OF LEAKAGE INSULATOR DETECTOR

FLAXIBLE AC/DC CLAMP METER



TOWER FOOTING RESISTANCE

At the foundation of every structure lies the importance of tower footing resistance, it has the ability to dissipate electrical energy safely into the ground. This becomes particularly crucial in areas prone to lightning and other electrical disturbances.

The Importance of Tower Footing Resistance

At the foundation of every structure lies the importance of tower footing resistance, it has the ability to dissipate electrical energy safely into the ground. This becomes particularly crucial in areas prone to lightning and other electrical disturbances. Tower footing resistance acts as a shield, protecting not only the structure itself but also the intricate systems within, from the potential havoc wreaked by electrical events.

The Role of a Strong and Reliable Foundation

A strong and reliable foundation ensures that the structure can withstand external pressures, environmental stresses, and unforeseen challenges. In the context of tower footing resistance, this foundation becomes the first line of defense against the forces of nature, especially electrical surges.

The importance of accurate measurement of tower footing resistance is essential, to ensure not just the structural integrity of a tower but also its robust defense against unpredictable electrical events, particularly lightning strikes. This measurement provide

SOME IMAGE OF TOWER FOOTING RESISTANCE

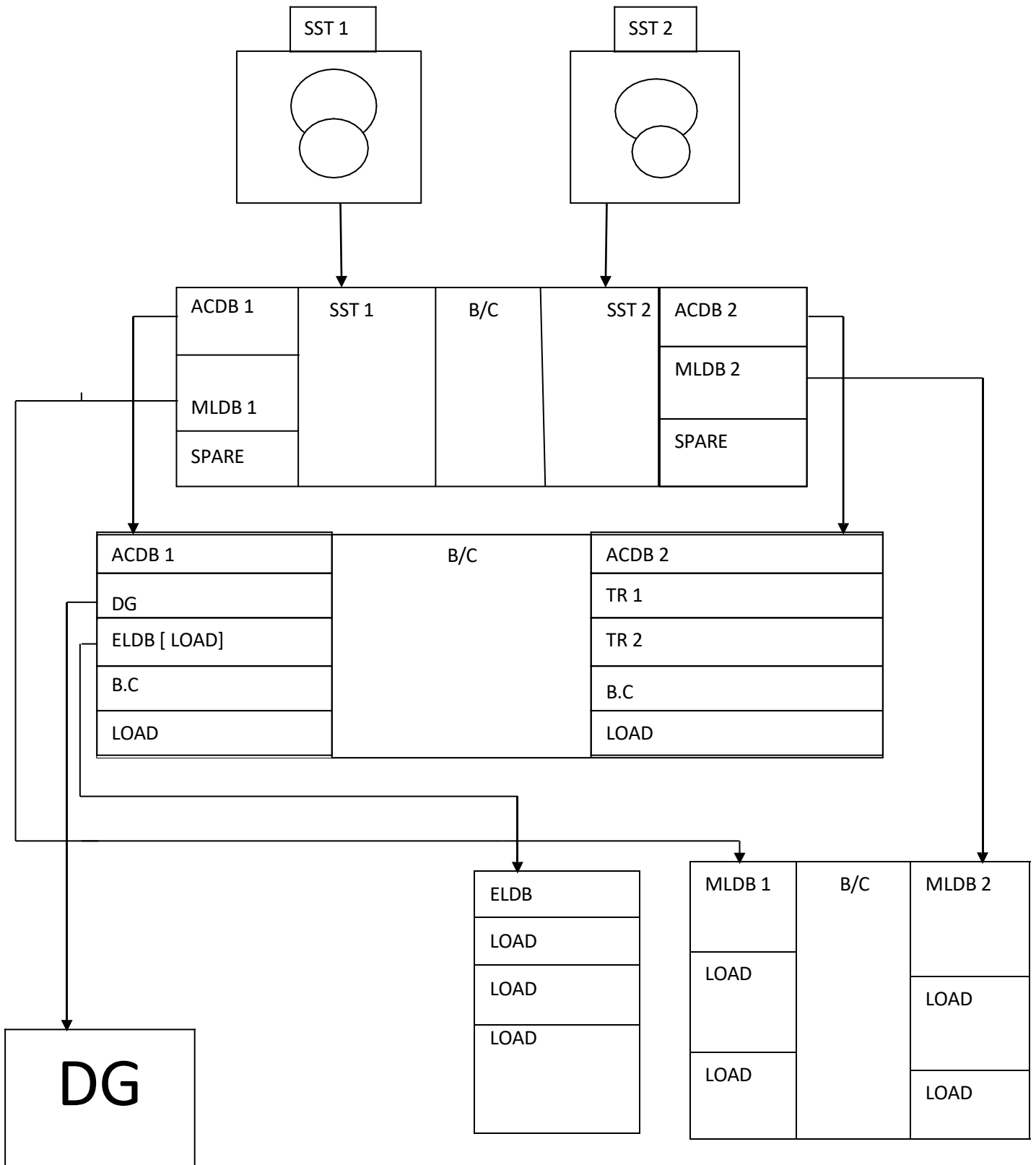




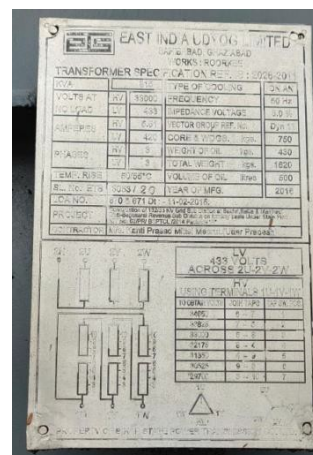
PUT
YELLOW
WIRE AWAY
10 MITURE
FROM THE
TOWER

PUT RED
WIRE 20
MITER FROM
THE TOWER

PUT GREEN
WIRE TO
THE TOWER
LEG



SST – SUB STATION TRANSFORMER



IN OUR GSS BENIPUR SST [SUB STATION TRANSFORMER] IS ABOUT 33KV/400

THE SST QUNTITY IS 02

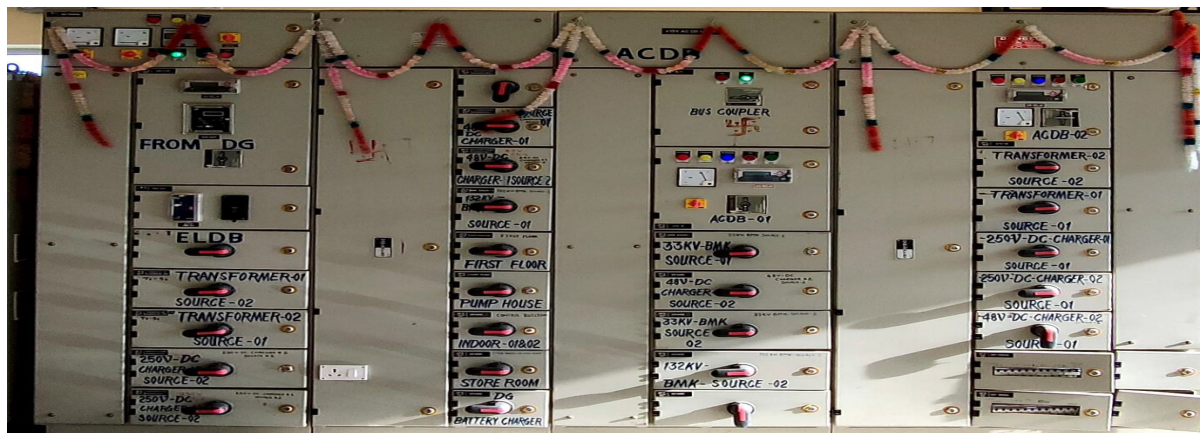
THE SST IS USED IN OUR GSS BENIPUR IS ONLY FOR RUNING THE GSS

MSB – MAIN SWITCHING BORD



IN OUR GSS BENIPUR THE MSB IS USE TO TAKE ELECTICITY FROM SST TO MSB AND AFTER THAT FOUTHER DIVIDE

ACDB – ALTERNATING CURRENT DISTRIBUTION BOX



IN OUR GSS BENIPUR ACDB IS TAKING ELECTICITY FROM MSB

DG ROOM AT GSS-BENIPUR.132/33kv



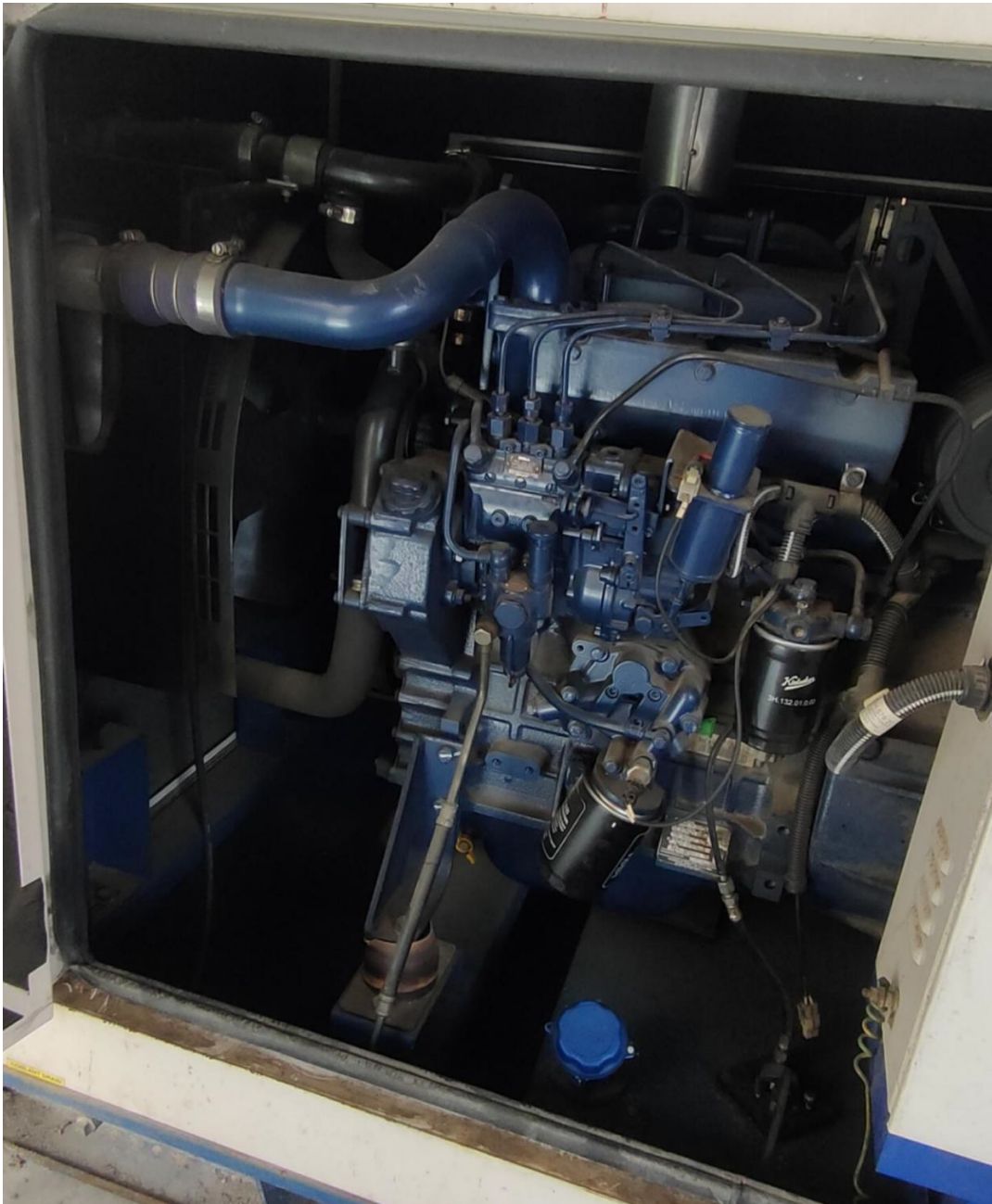
What is generator ?

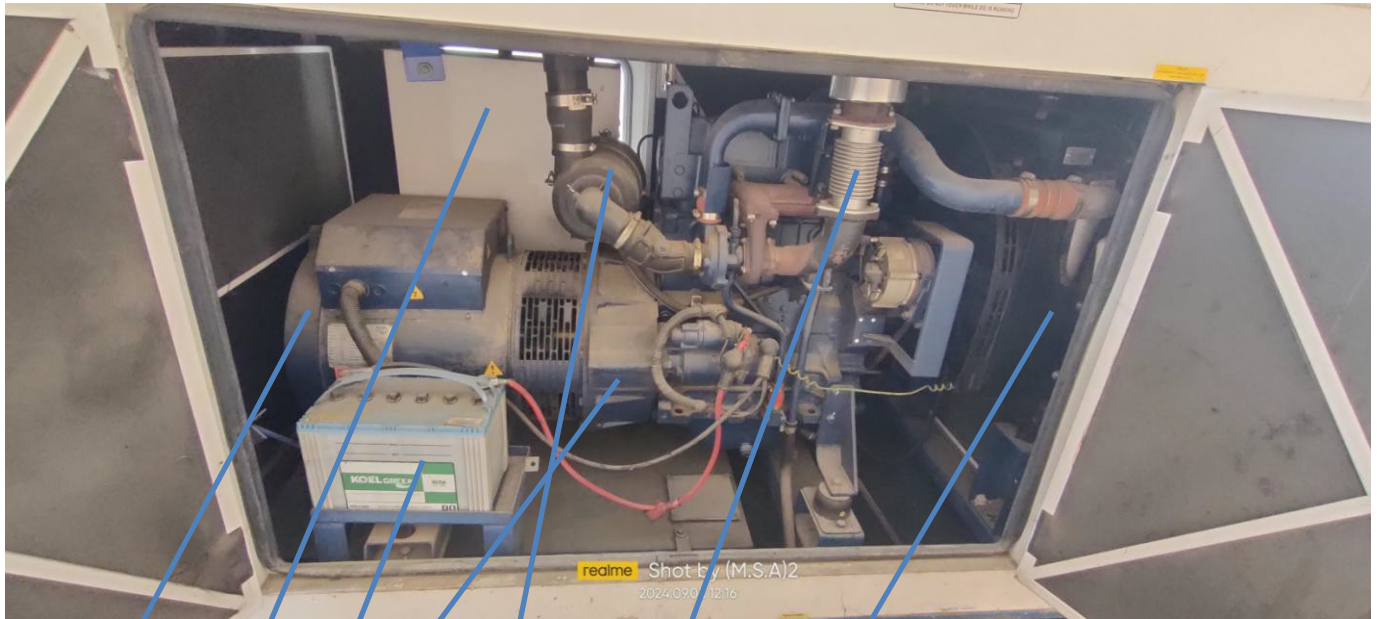


A Generator is a device which converts mechanical energy into electrical energy. A.C Generator works on the principle of electromagnetic induction. In generator

An electrical machine used to convert mechanical energy into electrical

electric generator, any machine that converts mechanical energy to electricity for transmission and distribution over power lines to domestic, commercial, and industrial customers. Generators also produce the electrical power required for automobiles, aircraft, ships, and trains. electric generator. Also called: dynamo.





Major components of a diesel generator

The major components of a diesel generator can be classified as follows:

1. Diesel Engine:

The source of mechanical energy input for generators. Its size and output capacity determine how much power a unit can generate.

2. Alternator:

Produces electrical energy from the mechanical input supplied by the diesel engine

3. Radiator & Cooling System:

As the generator *continuously* heats up various components, the cooling system helps withdraw heat produced when the generator is working.

4Exhaust System:

Exhaust fumes emitted by a diesel generator contain highly toxic chemicals that need to be properly managed.

5. Air Filter:

The filter is composed of fibrous materials, which removes solid particles such as dust, pollen, mold and bacteria from the air.

6. Control Panel:

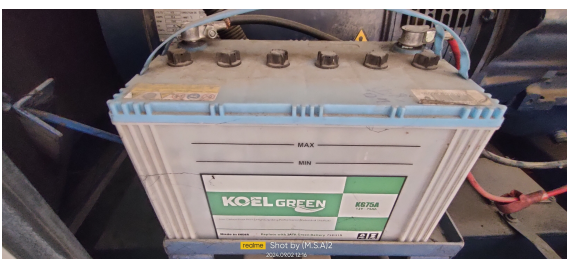
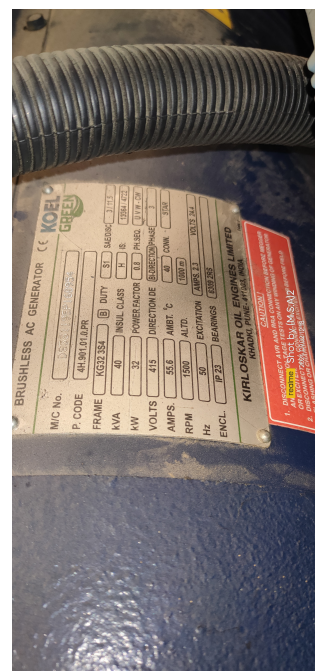
The user interface controls the generator, including start up and shut down controls, fuel gauges, phase selector switches etc.

Base Frame & Fuel Tank: The base frame provides a structural base support. The fuel tank stores fuel to be used by the generator, and it usually has an adequate capacity to keep the generator to run for 6-8 hours on an average.

7. BATTERY

BATTERY IS USED TO STATRT THE DG

SOME PICTURE OF THE MAJOR COMPONENTS OF A DIESEL GENERATOR.



40 KVA 3 PH AMF PANEL

Jakson & Company
Village: Panch, District: Noida, State: Uttar Pradesh
TRADE: D.T. OF PANCH, Noida, Uttar Pradesh

PANEL TYPE: G-1
RATED POWER: 40 KVA
RATED CURRENT: 55 A
RATED FREQUENCY: 50 Hz
RATED VOLTAGE: 415 V
SERIAL NO.: 100-100-100-100
MFG. DATE: 10/10/2018

LOAD ON NG
LOAD ON MAINS

ALARM
ACK/RESET
LOW OIL PRESSURE
HIGH ENGINE TEMPERATURE
BATT CHARGING
UNDER-SPEED
LOW FUEL LEVEL
RESET PUMPER

TEST AUTO MAN STOP START

CONTROL OFF/ON
CANDY LAMP OFF/ON
1. AUTO 2. MANUAL
1. MAIN CONTACTOR ON 2. DG CONTACTOR ON

For start

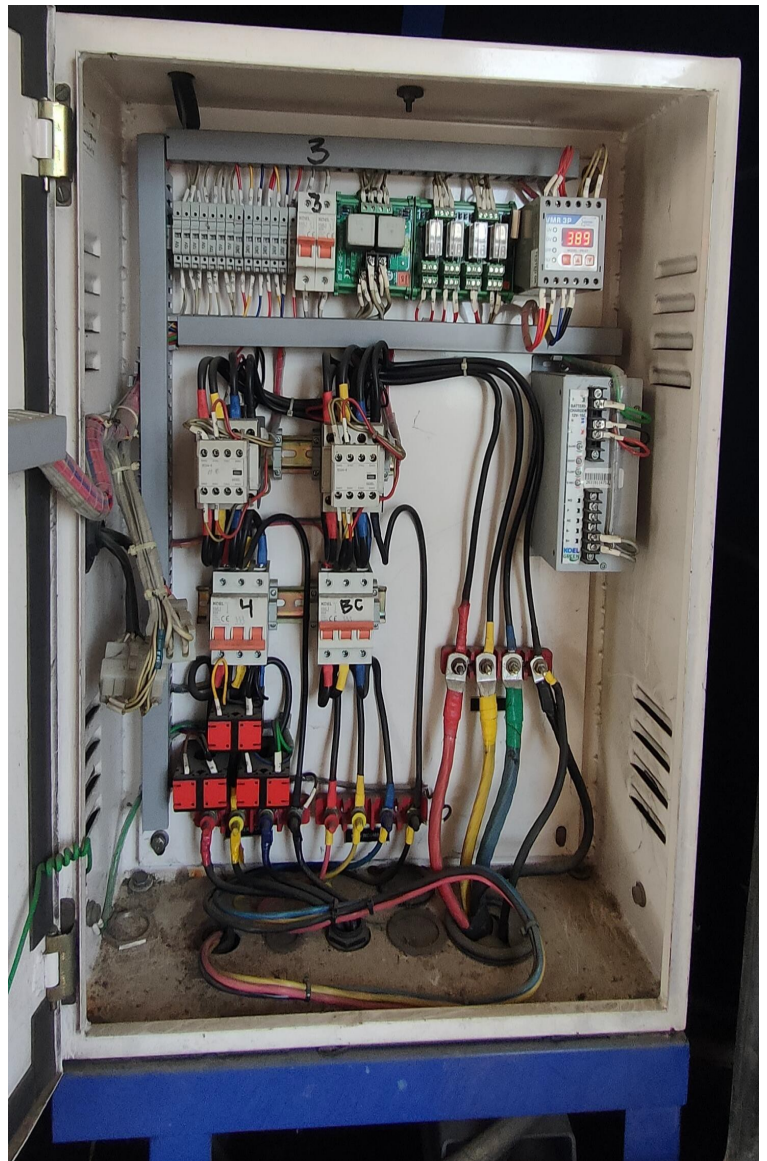
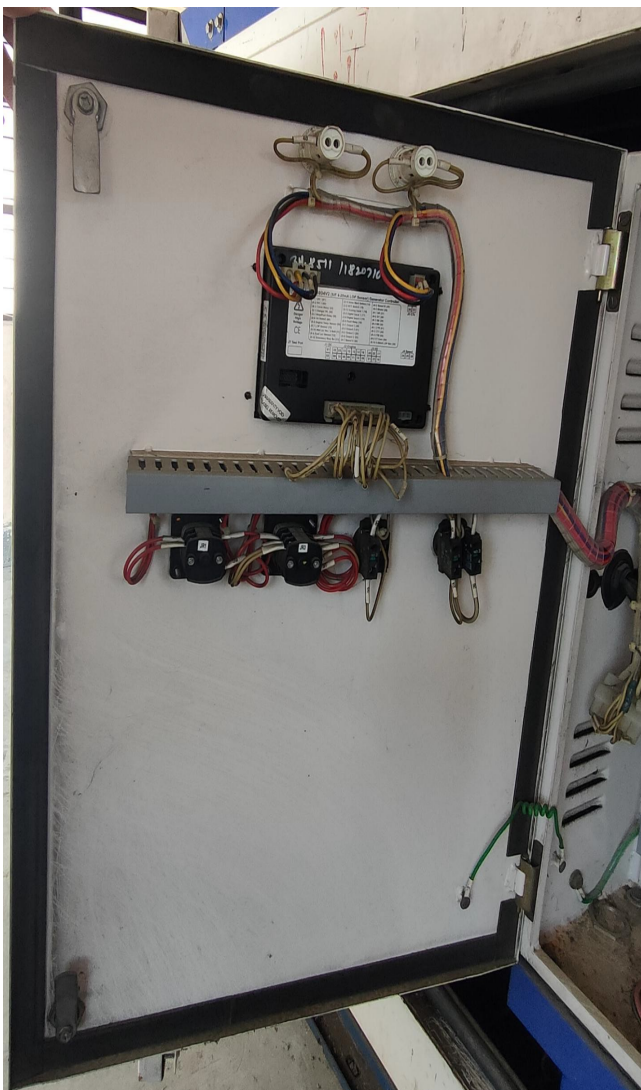
1. Control switch - ON ①
2. Selector switch - Manual ②
3. MCB - ON ③
4. PUSH START
5. After start, ④ MCB - ON LOAD
⑤ Selector switch - DG Contactor ON

DANGER



- 1.CONTRAL SWITCH ON- 01
- 2.SELECT SWITCH - MANUAL
- 3.MCB NO.3 ON
- 4.PUSH STATR
- 5.AFTER START- MCB-ON LOAD. SLECTOR SWITCH- DG CONTACTOR ON

INSIDE VIEW OF CONTROL PANNEL ↙



LM-TOWER

FOR PROTECTION OF GSS BENIPUR FROM THUNDERING LIGHTS
WE USE

LM TOWER

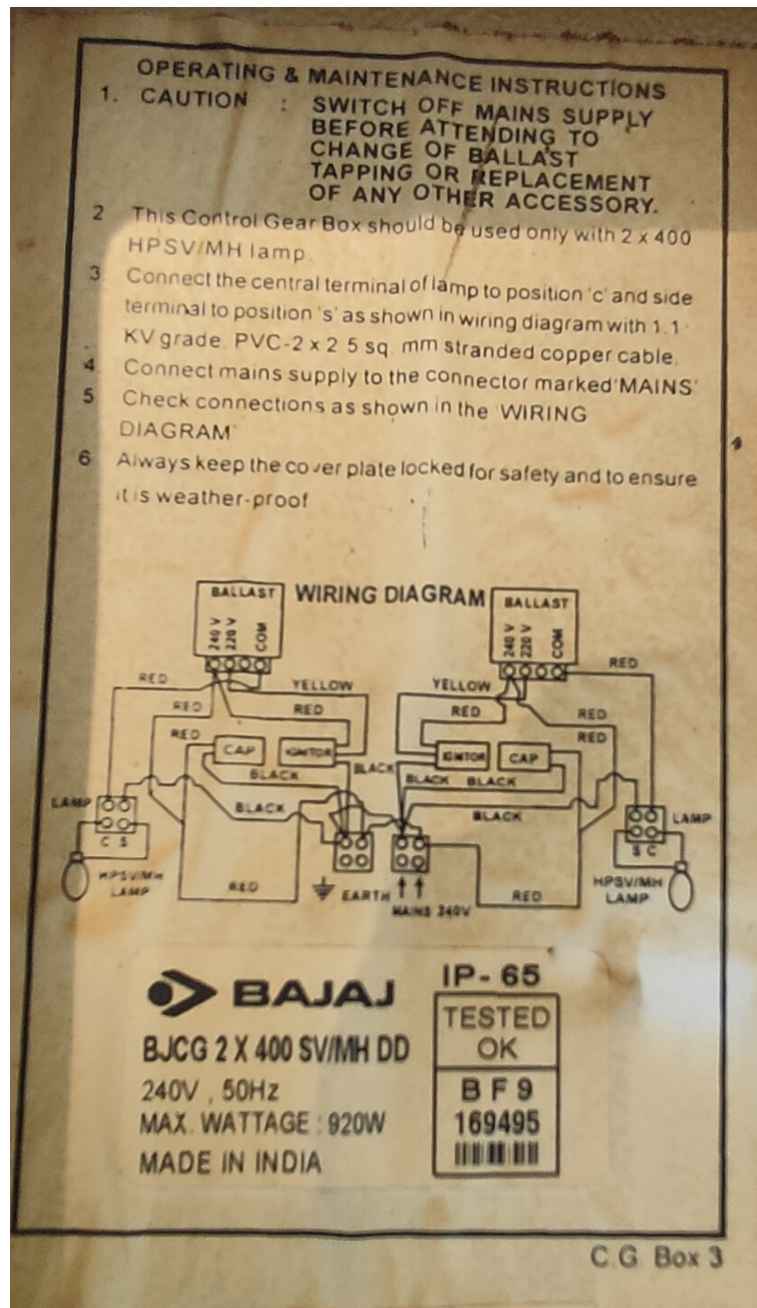
Lm tower is used for protection of greed from the thundering also for providing lightning into the gss,we use LED LIGHT , SODIUM LIGHT

Top of the tower lightning arrester available that is going through the wire into the graound

There are 04 LM TOWER available in gss benipur
The each tower hight is 30 fitt



Block Diagram of SODIUM LIGHT 400w



Repairing and maintenance of lightning equipments



Choke

220/240 volts

400 watt

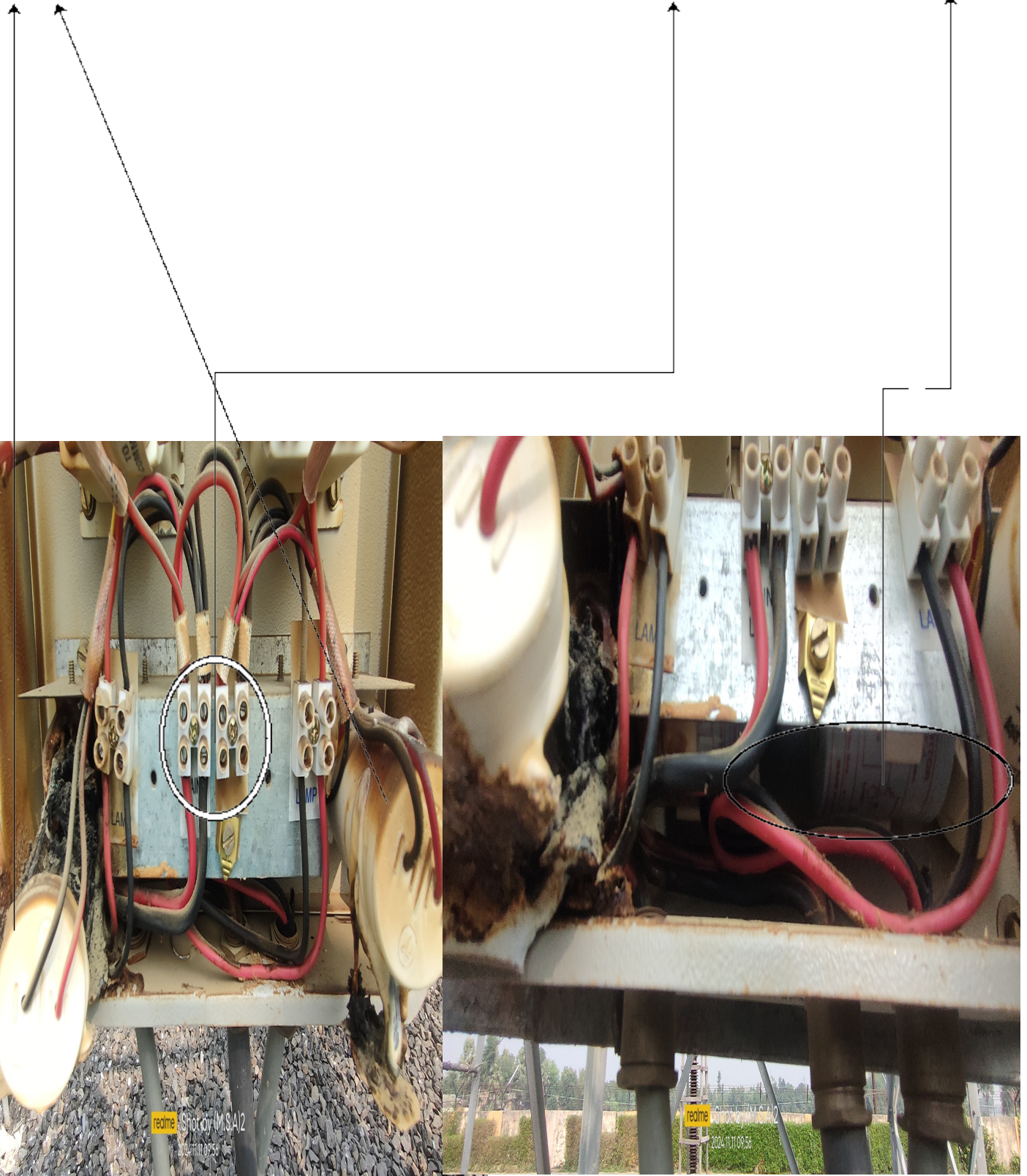
4.45 AMP



capacitor

Main
Light
250v

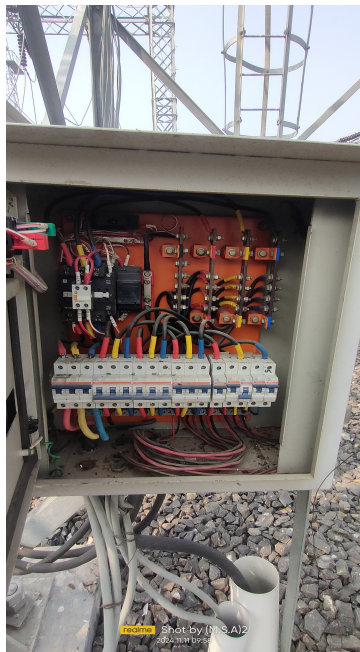
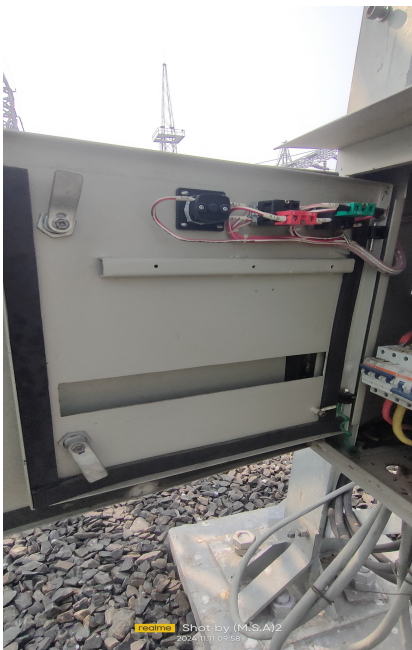
Ignitor



Out Side View Of Control Panel



Inside View Of Control Panel



Thank You